

Why Do IS Scholars Cite Other Scholars? An Empirical Analysis of the Direct and Moderating Effects of Cooperation and Competition among IS Scholars on Individual Citation Behavior

Completed Research Paper

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Abstract

Employing a theoretical framework based on social capital theory, we conceptualize previous citations by author A of author B as weak cooperation that indicates cognitive capital between these authors, and previous coauthorships between them as strong cooperation that captures relational capital between them. We propose that these two types of cooperation impact the citation behavior of author A. We also propose that competition between two authors arising from their affiliation similarity moderates the impact of both the strong and weak cooperation on individual citation behavior. Using a sample of all the 1034 authors who published papers in 10 premier IS journals in 2011, and their previous citation and coauthorship network data from 2006-2011, we found that the frequencies of previous citations and coauthorships are related to current citations, as hypothesized. Further, as hypothesized, these positive associations are weakened when the citing and cited authors have the same institutional affiliation.

Keywords: citations analysis, social capital, social network analysis, knowledge seeking

Introduction

Citations are widely used to evaluate scientific performance since the time the idea of citation count was introduced to the academia in 1927 (Gross et al. 1927). Across research disciplines, including the management field, it has been established that the number of citations to researchers' publications is associated with other assessments of scientific impact, such as appointment, promotion, awards, departmental prestige, research grants, academic rank and peer judgments (e.g., Bornmann et al. 2008; Judge et al. 2007; Long et al. 1998). Since citation count is so important to researchers' success and survival, there have been a number of studies that try to understand whether citation counts appropriately or disproportionately reflect researchers' scientific contributions (e.g. Woolgar 1991). Empirical findings have shown that the probability of being cited is determined not only by the accepted conventions of scholarship but also by many other extraneous factors, such as the year of publishing, the field of

publishing, journal characteristics, and culture/language barriers, etc. (Bornmann et al. 2008). In the field of management, Judge and colleagues (2007) found that the characteristics of articles, authors and journals all influence the probability of a citation. These empirical findings show that the citation behavior of a scholar does not merely reflect her intention to give credit to scholars whose work she used in her knowledge seeking, but is also driven by non-intellectual motivations. For example, if researchers believe that their audience regards some articles as authoritative, they tend to cite these articles to more effectively persuade their audience (Moed et al. 2004). Researchers may even strategically include citations with the aim of gaining the attention and the favor of referees, colleagues, or editors (Vinkler 1987). The non-intellectual motivations, hiding behind the intellectual reasons to cite articles, may influence the origins and evolution of research streams over time. Therefore, it is important to understand the extent to which knowledge seeking in scholarly research activities for which credit is given in terms of citations is influenced by intellectual and non-intellectual factors, especially in the information systems discipline where such an understanding is lacking. Further, the current literature on citation behavior has tried to examine a number of non-intellectual factors behind citations, but most factors examined in these studies were not driven by theory. The present study is an attempt to address these gaps to understand the important intellectual and social drivers of IS researchers' citation behavior. Specifically, we wish to examine the extent to which a citation by researcher A of researcher B is predicted by intellectual and social cooperation as well as competition between researcher A and researcher B.

Though research on citations among management scholars has received increasing attention (Golden-Biddle et al. 2006; Judge et al. 2007), there is relatively little understanding of what increases citation rates for a specific researcher. Bornmann and Daniel (2006) analyzed 30 studies in a review on scientists' citation behaviors from the early 1960s up to mid-2005, finding that whether or not a publication is cited depends on intellectual influences of scientific peers as well as other possible non-scientific reasons. Nevertheless, the focus of their review is when a publication will be cited rather than when a researcher will be cited. Similarly, Judge et al. (2007) also focused on the factors that influence citations to an article. In essence, these previous studies have focused predominantly on the quality of publications in specific fields or the scientific field as a whole, and less attention has been paid on when publications of specific researchers are cited. However, it is researchers who cite their colleagues' and other scholars' works and, thus, initiate the creation and evolution of their field. Furthermore, citations by other scholars of a researcher's publications have implications for the career growth of both the citing and the cited researchers. It is, therefore, very important to understand what leads to citations of specific researchers' articles, and is the focus of the current study.

This study has two goals. First, using a theoretical framework that is based on social capital theory (Nahapiet et al. 1998), we first examine how intellectual cooperation conceptualized as cognitive capital and social cooperation conceptualized as relational capital predict whether researcher A will cite researcher B's work. Second, given the fact that both coordination and competition coexist in the scientific field (Hagstrom 1974), we also use the notion of "coopetition" (Tsai 2002) to understand how the impacts of intellectual and social cooperation are contingent upon potential competition between citing and cited authors based on their affiliation similarity. In practical terms, citations among researchers in the IS field constitute a citation network in which the nodes are IS researchers involved and the ties are citations occurring between them. We, therefore, operationalized intellectual cooperation as previous citations by researcher A of researcher B, and social cooperation as previous coauthorship between researcher A and researcher B. A key premise of the present study is that citations of an article imply a knowledge flow from the authors of the article being cited to the authors of the articles that cite it (Zhuge 2006). In line with the cognitive dimension of social capital (Nahapiet et al. 1998), previous citations by an author A of an author B imply shared knowledge, understanding, and interpretations between them, which should logically be associated with future knowledge seeking action in terms of future citations by author A of author B. However, previous citations by author A of author B do not necessarily involve or require personal interactions and social closeness between the two authors and, thus, represent weak cooperative relationship, i.e., cognitive capital, between them. In contrast, previous coauthorships between two researchers usually involve frequent interactions, mutual support, and shared emotional experiences and, therefore, represent a strong form of cooperative relationship, i.e., relational capital, between them. Finally, we operationalize competition between a citing and a cited author in terms of their affiliation similarity as researchers with the same affiliation, i.e., within the same university/organization, often compete with each other to gain resources embedded within that organization. Thus, we examine how the

citation behavior of author A for author B changes due to the competition that emanates from their similar affiliation in spite of existing previous strong and/or weak cooperative relationships between them. To sum up, the fundamental research question that this study seeks to address is: What drives IS researchers' citation behavior and how peer competition among researchers moderates the influence of intellectual and social cooperation on their citation behaviors? The proposed hypotheses are tested using a sample of all 1034 authors who published articles in 2011 in 10 premier IS journals, and with data about this sample on citations and other variables pertaining to the period 2006-2011.

By investigating the above two issues, this study attempts to contribute to the literature in two ways. First, to our knowledge, this is the first study that addresses in a comprehensive way using a large data set the question of what drives IS researchers' citation behavior, rather than why particular articles are cited. We do so by linking social capital theory to citations analysis, because citations can not only be driven by non-scientific factors (Bornmann et al. 2008; Judge et al. 2007), social capital can also determine knowledge flows in knowledge intensive networks (e.g. Inkpen et al. 2005; Singh 2005) and citation behavior is essentially a knowledge seeking action in a knowledge network. Second, to our knowledge, this is also the first study, not only in the IS field but in the entire realm of citation studies in general, that carefully examines the impacts of competition between researchers on their citation behaviors. Previous studies of citation behavior have ignored the competitive nature of the scientific community and, thus, cannot fully explain why a researcher cites or doesn't cite another researcher's work. We do so by extending the social capital argument with Tsai's (2002) arguments about cooperation and competition in the process of knowledge sharing. We believe that by incorporating both cooperation and competition between citing and cited authors, this study provides a more comprehensive understanding about why a researcher cites another researcher in the IS field specifically, and in the broader management field more generally. From a pragmatic standpoint, we believe this study also has practical implications about the associations between researchers' career strategies (citation behavior) and the healthy evolution of the entire IS field.

Literature Review

Citations as Knowledge Seeking

Similar to the idea of knowledge sourcing (Gray and Meister 2004) and knowledge acquisition (Singh 2005), knowledge seeking is described as the cognitive activity by which individuals seek knowledge "through personal experiences or external memory" (Olivera et al. 2008). Dyadic knowledge seeking refers to a single knowledge seeker engaging in a seeking behavior with an individual source (Mason and Kaye 1989). The majority of research in knowledge sharing focuses on the contributors' side (Wasko and Faraj 2005). This research takes a different approach to understand the knowledge demanding side. Knowledge seeking is a complicated process. There are many factors that explain why individuals seek knowledge from a particular source (Gray and Meister 2004; Robert Jr et al. 2008). Antecedents of knowledge seeking addressed in previous research involve individual-level social resources embedded in network relationships (Adler and Kwon 2002) and take many forms of the social context, such as ties, trust, shared understanding, etc. (Inkpen and Tsang 2005). Previous studies have argued that social relations in networks play a pivotal role in resource exchange and knowledge transfer.

Citation behavior is a form of knowledge seeking in the context of academic research. Scholarly publications are a piece of knowledge representation of certain author(s), and also an expression of the developmental state of certain field(s) (Culnan 1987; Culnan and Swanson 1986; Taylor et al. 2010). In the scientific world, no one can be an expert in every academic domain (Culnan et al. 1986; Taylor et al. 2010). Citing the work of experts in certain domains is necessary for strong theory building as it is important to engage in "a constructive dialogue with other researchers who have examined the theory or theories that have guided research on a topic" (Sparrowe et al. 2011). Empirical evidence indicates that a large portion of knowledge seeking activities is to locate expertise from referrals: 45% of the information sources provided referrals, which helped a knowledge seeker efficiently locate relevant expertise or reusable work products (Cross et al. 2004). There are many factors that explain why individuals seek knowledge from a particular source (Gray et al. 2004; Robert Jr et al. 2008). Rooted in social science disciplines, social capital has become one of the most popular foci of inquiry for understanding knowledge acquisition (Inkpen et al. 2005). Recent work in social networks area indicates that knowledge seeking behavior is a form of contact between the two entities involved in the seeking action (Tortoriello

et al. 2010). In present study, the phenomenon of academic citation behavior is conceptualized as a form of knowledge seeking in a citation network. The individual-level social resources embedded in academic networks play a pivotal role in facilitating citation behavior as it reflects resource exchange and knowledge seeking between the researchers (Adler et al. 2002).

Citations among IS researchers can be mapped as a citation network, in which the nodes are the researchers and the ties are the citing-cited relationships between researchers. Authors cite other authors' articles as they share knowledge in the same domain. Citations are essentially knowledge flows in a citation network (Zhuge 2006). According to Zhuge (2006), when a citation occurs, it implies that some knowledge flow from the cited to the citing author took place, and the latter processed the acquired knowledge in various ways, including reasoning, fusing, generalizing, inventing, and problem solving. A citation occurred when the citing author decided to use the cited author's work. The cited author has no power or influence in the citing author's decision. Hence, the direction of such knowledge sharing is purely driven by the knowledge demanding side. The current study is concerned with understanding the knowledge seeker's knowledge acquisition activities, i.e., the citing author's citation behavior. Social network and social capital come to play an important role in citing authors' knowledge seeking behaviors as the goal of the knowledge seeker is to locate the right knowledge source from whom the knowledge flow to the former will take place.

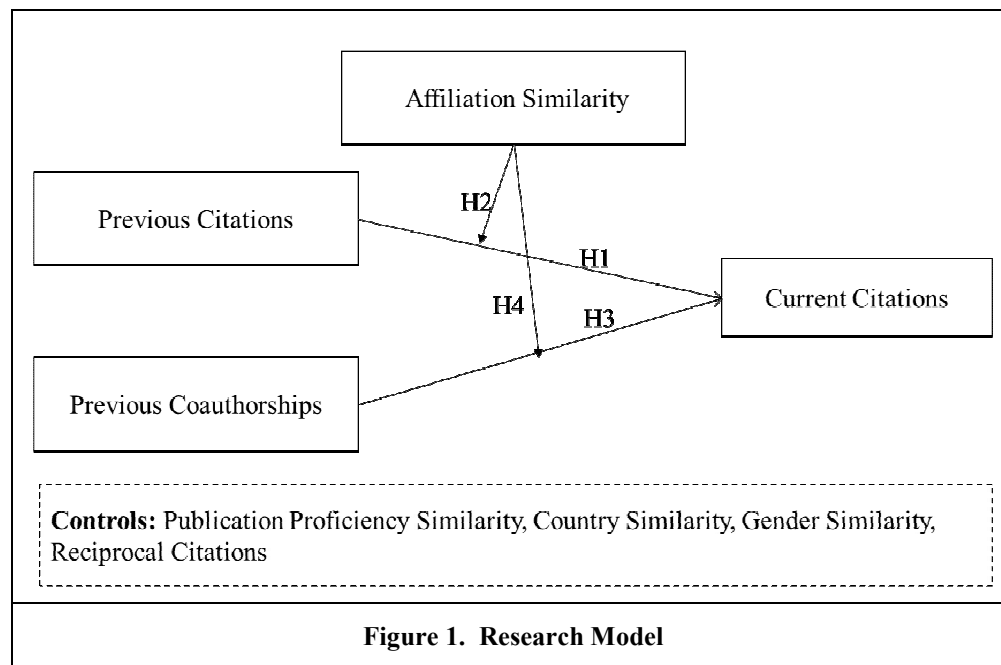
Cooperation and Competition in Citations

The concept of *coopetition* was introduced by Tsai (2002) in the social networks arena to emphasize the simultaneous cooperative and competitive nature of the relationship between two subjects involved in knowledge sharing in a social network. Social capital constitutes a potential resource embedded within such relationships (Coleman 1989) and is defined as the sum of the resources that exist or can be available or driven from the network of relationship possessed by an individual (Nahapiet et al. 1998). With regard to knowledge creation, two types of social capital are more relevant: the relational and the cognitive capitals (Nahapiet et al. 1998). Previous coauthorship reflects the relational capital between the citing and cited authors as effective collaboration as co-authors requires relationship maintenance over a period of time, which generates the basic mutual trust according to fair social exchange theory (Li et al. 2013). Co-authorship could be regarded as a strong cooperative relationship that provides both authors with "privileged access to information and to opportunities" (Nahapiet et al. 1998) based on the definition of relational capital as it signifies a personal relationship that is developed through a history of interpersonal interactions (Coleman 1989) between the two co-authors.

Previous citations reflect knowledge seeking by the citing author from a cited author. When the citing author integrates the knowledge acquired from the cited author with knowledge from other sources, it is important to have shared understanding and interpretations on the cited pieces of knowledge with the cited author. Since cognitive capital is a form of social resource providing shared interpretations, such as shared language and codes (Nahapiet et al. 1998), the extent to which the citing author cited the work of the cited author reflects the amount of cognitive capital between the pair. In this case, the cooperation between two parties is cognitive/intellectual based on their shared knowledge and interpretations, and is done to further develop and advance the knowledge in the citing author's research domain. Since citations may happen when the citing and cited authors do not know necessary know each other personally, such relationships are weak and instrumental, without frequent personal interactions, trust, or affect.

While cooperation may exist between a pair of citing and cited authors, both the strong type and the weak type reflected by relational and cognitive capitals between them, respectively, there also exists potential competition between them. Tsai (2002) has pointed out that both cooperation and competition can exist simultaneously among individuals and groups. While cooperating with each other, individuals or groups also compete with each other from many perspectives such as resources and reputation (Reagans 2005). Competition, as a basic social process, is likely to be strong, especially when the two individuals share socially similar backgrounds. Individuals from the same social category are compared with each other a lot. The competitors themselves also evaluate their self-worth comparing themselves to their peers with the same or similar social backgrounds (Burt 1982; Reagans 2005). One individual's achievement increases the likelihood that her peers in the same social category will feel disadvantaged and indigent. Consequently people with similar social backgrounds compete to sustain or raise their social status (Burt 2009). For example, Fuchs (1992) pointed out that within the elite research groups working on the cutting

edge of the field, competition is extremely intense. Number of citations functions as one the most important parameters that are used to assess the stature of researchers. Therefore, the citation behavior of a citing author is likely to be different for a cited author when both these authors work in the same university, as they will be compared with each other based on their citation numbers for allocation of research resources, promotions, and other rewards. Accordingly, citation behavior of a citing author in the academia is a result of both cooperative and competitive factors. Therefore, we develop a model shown in Figure 1 below of current citations with the two types of cooperation coinciding with the two social capital dimensions as antecedents and competition arising from affiliation similarity as a moderator of the influence of the social capital dimensions on current citations.



Relational Capital and Affiliation Similarity in Citations

Empirical results show that relational capital enhances knowledge exchange among scientists (Bouty 2000). Relational capital refers to the strength of the relationships in a network of relationships. With frequent interactions, the closeness between two network actors and the relationships between them increases over time (Reagans et al. 2003). Relational capital is a joint resource available to all network actors in terms of goodwill, trust and obligations among them (Adler et al. 2002). Relational capital generates group solidarity and generalized reciprocity that helps overcome free-riding (Yamagishi et al. 1993). One essential requirement of knowledge seeking is the seeker's perception of the knowledge value, expertise, access, and seeking cost from a particular individual within the network (Borgatti et al. 2003). Relational capital allows the seekers opportunities to identify the value of the source's knowledge and reduces cost of seeking knowledge.

In academia, coauthorship occurs when two authors trust each other and share the willingness to collaborate without the worries of being unfairly rewarded (Li et al. 2013). Mutual trust between the coauthors is built over time through their cooperative experiences, and the fair reward from this collaboration to the collaborating authors is the basis for their future cooperation. Also due to trust from previous coauthorship experience, an author is prone to seek the co-author as a trusted knowledge source whenever there is a need to seek new knowledge. Such behavior of citing authors is more important in the world of academia, where the knowledge authenticity and reliability are extremely important and vital for academic survival. For the citing author, citing coauthor's work is a convenient choice of knowledge

referral as familiarity with the previous coauthor provides access at a low cost to knowledge in the citing author's domains that the citing author deems to be valuable. Therefore, we hypothesize that:

H1: The frequency of current citations by a citing author i of a cited author j is a positive function of the frequency of previous coauthorships between the two authors.

Relationships within the same academic institution constitute a social structure of cooperation as well as a system for competition (Burt 2009). Similar to business companies (Tsai 2002), researchers within the same institution compete for similar limited resources internally, and produce similar products (publications) in the same IS field externally. When evaluating a faculty member's performance, a school is likely to compare the individual with his/her colleagues in the same discipline and allocate resources and rewards according to their relative performance including citation numbers, creating competition among them for resources and rewards. Further, comparisons of faculty members' performance in the same institution based on citation numbers also create competition for reputation among them (Reagans 2005). Advancement by one researcher is thought to come at the cost of the other researcher, so the other researcher feels he/she is falling behind without the same rewards. Therefore, while previous coauthorship as relational capital encourages researchers to seek knowledge from their coauthors, affiliation similarity between two previous coauthors will reduce the likelihood of one coauthor seeking knowledge from the other previous coauthor in the same institution. In addition, different affiliations between coauthors indicate different academic cultures. As a result, a different affiliation between coauthors would make their cooperative relationship relatively weaker as compared to relationships between coauthors with similar affiliation. Therefore, according to Granovetter's (1973) weak tie theory, previous coauthorships of a citing author with a cited author from a different institution should have a higher influence on current citations by the citing coauthor of the cited coauthor as the citing coauthor is exposed to a different working style and new knowledge that potentially expands the range of the research domain much more as compared to a similar affiliation for the two coauthors. Thus, we hypothesize that:

H2: The positive association between the frequency of previous coauthorships and the frequency of current citations by a citing author i of a cited author j is weakened when the two authors have the same institutional affiliation.

Cognitive Capital and Affiliation Similarity in Citations

Knowledge seeking is costly and especially time-consuming (Cullen et al. 1988). Individuals engaging in knowledge seeking are more likely to begin their search with the least effortful approach (Newell et al. 2004). The likelihood of finding the right information depends on the searching-index quality (Olivera et al. 2008) as the same concepts can be expressed in different words by different people (Markus 2001). Ineffective searching with improper index will result in large portion of irrelevant information and a waste of time and energy (Marwick 2001). Cognitive capital provides network members with shared interpretations and understanding (Nahapiet et al. 1998). The common language between the seeker and the source is extremely important for effective and efficient knowledge seeking with understanding of the goals and proper ways of interaction (Tsai et al. 1998). Seeking knowledge from a certain knowledge source is a function of the extent to which the seeker knows the source's area of expertise (Borgatti et al. 2003). Previously cited articles provide an effort-saving choice if a similar concept and construct is used in a current paper. The citing author already shares a common language and interpretations with the cited author based on previous citations by the citing author of the cited author. Previous citations constitute a reusable searching index that is high in quality and appropriateness and low in terms of cost of time and efforts in the knowledge seeking process.

Citing in academia is essential and highly dependent on the relevant previous studies. Without citing relevant prior articles, the value of contribution of a current study is questionable. The theoretical contribution of a current study is also not clear without comparison of the current study with previous literature (Sparrowe et al. 2011). While building theory in an article, engaging with prior research is one essential step in preparing journal articles in the management disciplines and a critical requirement for submission. Citing prior studies does require the citing author to build his/her own logic of argument from the elements of previous literature. Therefore, the citing author should be familiar with the literature that is related to his/her current study. Strategically, previous citations of other authors by the citing author in his/her own previously published/accepted papers constitute a reusable search index that provides a set of familiar materials for effective theory building in a time and cost efficient manner, as it is

relatively easier to search and cite other scholars in the current study who were cited previously in the same domain as the current study (Judge et al. 2007). As a result, it is believed that cognitive capital facilitates knowledge seeking among academic scholars. Therefore, we hypothesize that:

H3: The frequency of current citations by a citing author i of a cited author j is a positive function of the frequency of previous citations by author i of author j.

Similar to relational capital, cognitive capital also suffers in terms of its impacts on current citation behavior from the competition brought on by the condition of same affiliation between the citing and the cited authors. Citations are used as an important index of academic performance (Cronin et al. 1994) and publications in journals with high impact factors bring the advantage of a higher citation rate in the academia (Judge et al. 2007). When the citing-cited pair share the same affiliation, the competition between the pair again arises from internal resource allocation and rewards as well as external reputation and rewards in the field (Reagans 2005). Therefore, while previous citations by author i of author j encourages author i to seek knowledge from author j in a current study, as discussed above, the likelihood of current citations by author i of author j is again expected to be reduced due to competition between the two authors sharing the same institutional affiliation. Further, not only focus but diversity in research is also essential in the information systems discipline, as it is in most management disciplines, to thrive in the academia (Taylor et al. 2010). Therefore, to gain credibility and to seek high reputation in the academia, scholars are expected to cite in a comprehensive manner diverse sources from diverse institutions that are pertinent to their current studies and not limit themselves to cite predominantly their colleagues in the same institution. Consequently, we propose that similar affiliation reduces the positive effect of cognitive capital on knowledge seeking. Accordingly, we hypothesize that:

H4: The positive association between the frequency of previous citations by a citing author i of a cited author j and the frequency of current citations by author i of author j is weakened when the two authors have the same institutional affiliation.

Data and Measurement

Sample

We first defined the focal authors as those authors who published articles in 10 premier IS journals in 2011. These 10 focal journals are *Decision Support Systems*, *European Journal of Information Systems*, *Information & Management*, *Information Systems Journal*, *Information Systems Research*, *Journal of the AIS*, *Journal of Information Technology*, *Journal of MIS*, *Journal of Strategic Information Systems*, and *MIS Quarterly*. Eight of these 10 journals are in the AIS Senior Scholars' Basket of Journals (<http://aisnet.org/?SeniorScholarBasket>). We add *Decision Support Systems* and *Information & Management* to this list as both journals have consistently been ranked as premier journals in various rankings of IS journals based on survey data as well as journal impact factors. We gathered all publication and citation related data for citing-cited author dyads for the 1034 focal authors and their articles published between 2006 and 2011, including dyad-wise previous citations (during 2006-2010), previous reciprocal citations (during 2006-2010), previous coauthorships (during 2006-2010), and current citations (during 2011) as well as each focal author's affiliation, gender, publication proficiency, and country where his/her institution is located. Our dataset gives us the opportunity to examine the influence of social capital on citation behavior with two types of networks: the citation network and coauthorship network. More details of our variables and analyses are discussed below.

Measurement and Operationalization of Variables

All dyadic attributes for every citing and cited author pair (abbreviated as an author pair or an author dyad) were created by considering data about each author along with data about the other 1033 authors and himself/herself pertaining to articles published in the 10 focal journals. Hence, each variable in this study is represented in a 1034*1034 matrix as it represents a particular relationship or attribute between each possible dyadic combination of the 1034 focal authors. Since each matrix is a square matrix of the 1034 focal authors, the diagonal represents self-comparison relationships or attributes. Further some variables in our study are directional, such as frequencies of previous and current citations by an author i of an author j. For instance, citations by an author i of author j are not the same as citations by author j of

author i , the latter being reciprocal citations of this author dyad. On the other hand, some other variables in our study are directionless, such as frequency of coauthorship between an author pair or affiliation similarity between an author pair, resulting in symmetric matrices for these variables.

Current knowledge seeking by an author i from an author j is operationalized as the number of citations by author i of author j in all articles published in the 10 focal journals during the year 2011. Cognitive capital between a citing author i and cited author j is operationalized as the number of citations by author i of author j in all articles published in the 10 focal journals during the period 2006 to 2010. Relational capital between this author dyad is the number of papers coauthored by the citing author with the cited author in all articles published in the 10 focal journals during the period 2006 to 2010. It should be noted that while the sample of citing materials in this study included only the articles published in the 10 focal journals during the relevant period, all citations within these citing articles for an author pair were counted including those to materials published in other than the 10 focal IS journals, such as other IS journal articles, journal articles published in other disciplines, conference proceedings, book chapters, etc. However, previous coauthorship between author pairs was counted only for articles published in the 10 focal journals in during 2006-2010. The higher the number of previous citations or previous coauthorships, the stronger is the relationship between the two authors in the author dyad. Affiliation similarity is a dummy variable with a value of 1 indicating that an author pair is from the same institution in 2011 and 0 otherwise.

In this study, we controlled for other important factors that can affect an individual author's citation behavior. As Judge et al (Judge et al. 2007) argued, a scholar is more likely to cite publications from certain individuals based on their past productivity, affiliation prestige, and gender of the cited author. The intellectual credit given to and the reputation and the social position of an author is high when he/she publishes in top journals. Also publishing in high-quality journals requires referencing to high-status scholars as this provides legitimacy to the citing author's work (Judge et al. 2007; Sparrowe et al. 2011). Therefore, we include publication proficiency similarity between the author pair as a control variable in this study. Further, the high social position of authors can also be indicated by their university prestige. Multiple empirical studies have shown that scholars from elite universities are more productive in top-tier journals (Long et al. 1998), and gain more recognition and reputation than those from non-elite universities (Crane 1965; Helmreich et al. 1980; Rigney 2013). Therefore, we include affiliation prestige similarity between the author dyad as a variable in a post hoc analytical model. Further, prior research has shown that male and female scientists differ in scholarly activities due to gender gap and biases (Sotudeh et al. 2014). Also, status homophily, such as gender homophily, is a salient predictor in social relationships (McPherson et al. 2001). Therefore, we include gender similarity between the author dyad as a control variable in our model. This is relevant to our analysis as the names of authors are often an easy indicator of their gender, and could affect citation behavior of individual authors. Besides the three variables mentioned in Judge's study, we also consider country similarity between the author pair as a control variable in the present study because academic activities in different countries maybe different (Pezzoni et al. 2012) as competition for limited resources depends on the different types of promotion and reward systems that may be prevalent in universities across different countries. Also, the citation impact for management research has been found to be different between the east and west (Leung 2007). Finally, self-citations and "payback" for previous citations are a common phenomenon in the academia (Kazdin 1975; Pieters et al. 2002; Scarlett Lo 2010). Therefore, in this study we do not include any self-citations and all citations of an author i exclude self-citations to the same author i . Further, we also control for reciprocal citations in our model, i.e., previous citations by an author j of an author i where author i is the current citing author and author j is the current cited author, to ensure that our logic of cooperation and competition is not contaminated by the broader kind of cooperation that may result from a "payback" of past citations.

To calculate publication proficiency of an author, we performed a cluster analysis with a two-cluster solution and used five variables that differentiate authors in terms of their publication activities. These variables include: 1) the total number of articles published by an author during 2006-2010 in the 10 focal journals (for capturing overall publication productivity of the author); 2) the number of journals from among the 10 focal journals in which the author published articles during 2006-2010 (for capturing focus or breadth in target journals of an author); 3) the minimum of the 5-year impact factors for all journals in which the author published articles during 2006-2010 (for capturing the lowest impact target journal of an author); 4) the average of the 5-year impact factors for all journals in which the author published

articles during 2006-2010 (for capturing the average impact target journal of an author); and 5) the maximum of the 5-year impact factors for all journals in which the author published articles during 2006-2010 (for capturing the highest impact target journal of an author). Results in Table 1 show the means for the two clusters for the above five publication proficiency-related variables based on focal author publications within the 10 focal journals during 2006-2010. Results of this analysis also indicate that 339 authors belong to Cluster 1 and 695 authors belong to Cluster 2. T-tests between the two clusters indicate that the mean values for the five variables between the two groups of authors are significantly different. Publication proficiency similarity for an author pair is then calculated as a dummy variable with a value of 1 indicating that the author pair comes from the same publication proficiency cluster, and 0 otherwise.

Table 1. Cluster Analysis of Focal Authors for Computing Author Publication Proficiency		
Clustering Variables (for articles published by an author in the 10 focal journals during 2006-2010)	Mean of Cluster 1	Mean of Cluster 2
Total number of articles published	4.3	0.3
Total number of journals in which articles published	2.5	0.3
Minimum 5-year impact factor of journals in which articles published	3.5	0.6
Average 5-year impact factor of journals in which articles published	2.8	0.6
Maximum 5-year impact factor of journals in which articles published	4.7	0.6

Table 1. Cluster Analysis of Focal Authors for Computing Author Publication Proficiency

Therefore, four constructs were included as control variables in our main model: 1) publication proficiency similarity (whether or not an author pair belongs to the same publication proficiency cluster); 2) country similarity (whether or not an author pair is affiliated with a university in the same country); 3) gender similarity (whether or not an author pair has the same gender); and 4) reciprocal citations (how many times a cited author in a current citing-cited author pair cited the citing author during 2006-2010). The three similarity variables (publication proficiency similarity, gender similarity, and country similarity) yield symmetric matrices since each variable is a dummy, directionless variable capturing a particular aspect of an author pair difference. The reciprocal citations matrix is calculated as the transpose of the previous citations matrix for the period 2006-2010. Further, in a post hoc analysis, we replace *affiliation similarity* (whether or not an author pair belongs to the same institution) with *affiliation prestige similarity* (whether or not an author pair belongs to an elite institution) to test Judge et al.'s (2007) proposition that affiliation prestige impacts article citations. We consider four combinations of affiliation prestige similarity for an author pair based on their university affiliations and 2012 World University Ranking from Times Higher Education (<http://www.timeshighereducation.co.uk>). More details on the operationalization of this variable are provided when we discuss the post hoc analysis.

To compute a matrix that represents the interaction of cooperation and competition, we multiply each cell ij of each of the two social capital matrices (cognitive and relational capitals) with corresponding similar cell ij in the affiliation similarity matrix. This calculation produces two possible values in each of the two multiplied matrices. A value of "0" means there is neither social capital nor affiliation similarity between the author pair and a value of "n" (i.e., any value other than 0) means that the two authors in the author pair are from the same institution AND that they have a certain level of social capital between them (previous citations for cognitive capital and previous coauthorships for relational capital).

To make things concrete, let us consider the example of an author i who cited author j one time in one article in Information Systems Research published in 2011. Therefore, the seeking behavior value from citing author i to cited author j is positive and coded as "1" in dependent variable matrix. The total number of citations by author i of author j in articles published during 2006-2010 in the 10 focal journals is the

cognitive capital for that author pair. The relational capital for that author pair is the total number of coauthorships of authors i and j on all articles published in the 10 focal journals during the period 2006-2010. Reciprocal citations is a variable that measures the number of times author j (in the current author pair with citing author i and cited author j) cited author i during 2006-2010. To calculate the interaction terms matrix for affiliation similarity and relational capital, cell ij in the coauthorship matrix is multiplied with cell ij in the affiliation similarity matrix. Similarly, the interaction terms matrix for affiliation similarity and cognitive capital is calculated by multiplying cell ij in the previous citations matrix with cell ij in the affiliation similarity matrix.

Main Results

Multiple Regression Quadratic Assignment Procedures (MRQAP)

Due to the network-oriented data in this study in which all variables are contained in square matrices each of which capture show specific type of relationship among 1034 subjects, regular OLS regressions cannot be used as the fundamental assumption of independent distribution of error terms is violated in this type of network data. Krackhardt (1988) has pointed that estimation of the second moments is biased “to such an extent that it is not uncommon for type I errors of t-statistics to exceed 50%” (Krackhardt 1988) if standard OLS is used when even a moderate amount of structural autocorrelations are present. Therefore, we use Multiple Regression Quadratic Assignment Procedure (MRQAP), which is a new regression technique that is designed to overcome the dependency problem in network data, to test our hypotheses in this study, as MRQAP is designed to conduct “permutation tests for multiple linear regression model coefficients for data organized in square matrices of relatedness among n objects” (Dekker et al. 2007).

MRQAP Results

Results of hypotheses 1-4 are shown in Table 2 below. Several models are tested beginning with a control variables only model (Model 1), controls + independent variables (IVs) (Model 2), controls + IVs + interaction of cognitive capital and affiliation similarity (Model 3), controls + IVs + interaction of relational capital and affiliation similarity (Model 4), and the full model (controls + IVs + interactions of both cognitive and relational capitals with affiliation similarity) (Model 5).

Table 2. Main Results with MRQAP Models						
Dependent Variable: Current Citations (by author i of author j)						
		Model 1	Model 2	Model 3	Model 4	Model 5
Controls	Publication Proficiency Similarity	-0.005***	-0.007***	-0.007***	-0.007***	-0.007***
	Country Similarity	0.023***	0.014***	0.014***	0.014***	0.014***
	Gender Similarity	0.004**	0.003**	0.003**	0.003*	0.003**
	Reciprocal Citations	0.048***	0.028***	0.028***	0.028***	0.028***
IV	Affiliation Similarity		0.013***	0.022***	0.014***	0.023***
	Previous Citations		0.122***	0.122***	0.122***	0.122***
	Previous Coauthorships		0.049***	0.049***	0.051***	0.051***
Interaction	Previous Citations * Affiliation Similarity			-0.011***		-0.011***
	Previous Coauthorships * Affiliation Similarity				-0.004***	-0.004***

R square	0.003	0.023	0.023	0.023	0.023
# of observations (author dyads)	1068122	1068122	1068122	1068122	1068122

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Table 2. Main Results with MRQAP Models

Model 1 shows an R^2 value of 0.003 with the other models yielding an R^2 value of 0.023 each. Before we discuss the predictive nature of the two social capital dimensions, it is worth mentioning that while the R^2 values for each model are quite small, this should come neither as a surprise nor be a matter of concern. Burris (2005) used QAP to test the association between interlocking board relationship and the similarity of political activities with 289,180 dyads. He pointed out that small R^2 value should not influence the contribution of results when the ties between nodes that are the main focus of interest are only in a tiny fraction of all possible dyads in the sample. This is because the explained variance associated with these ties would be small, simply due to the radically different distributions of the dependent and independent variables. In the present study, the number of observed author dyads is 1,068,122 while there are only 457 articles that include all citation behaviors of interest, expectedly yielding small R^2 value. Meanwhile, Burris suggested that when the sample is extremely large, small effects can still achieve a high level of statistical significance so that the important point should not be the statistical significance of independent variables but the relative size of coefficients associated with these variables.

In the present study, the suggested independent variables yielded significant coefficients; more importantly, these coefficients varied saliently in terms of their magnitude, providing a straightforward way to compare the impact of the two dimensions of social capital on an individual author's current citation behavior. When considering the two dimensions of social capital together (Model 2), we get two significantly positive relationships between the two dimensions and current citations. As proposed in Hypothesis 1, previous coauthorships between an author pair is positively associated with current citations of that author pair ($b = 0.049$, $p < 0.01$ in Model 2). Further, the positive effect of previous citations of an author pair on their current citations, as proposed in Hypothesis 3, was also supported in our study ($b = 0.122$, $p < 0.01$ in Model 2). The relative sizes of these two coefficients indicate that previous citations of an author pair is a more dominant predictor of current citations than the previous coauthorships of that author pair, with an effect size for previous citations that is more than four times the effect size for previous coauthorships.

As proposed in Hypothesis 2, results in our study show that affiliation similarity between an author pair reduces the positive effect of previous coauthorships' of that author pair on their current citations ($b = -0.004$, $p < 0.01$ in Model 5). Further, as proposed in Hypothesis 4, results also show that affiliation similarity between an author pair also reduces the positive influence of previous citations' of that author pair on their current citations ($b = -0.011$, $p < 0.01$ in Model 5). These results imply that same affiliation reduces an author's intention to cite previously-cited authors and/or previous coauthors. Comparing the effect sizes of the two moderating effects, it is clear that the positive effect of previous citations on current citations takes a much bigger hit from an author pair's similar affiliations, nearly 2.75 times, than the hit positive effect of previous coauthorships on current citations takes from similar affiliations of that author pair.

Of the four control variables (publication proficiency similarity, country similarity, gender similarity, and reciprocal citations), similar gender turns out to be the one variable that has the weakest significant effect on academic citation behaviors. Further, results for Model 5 in Table 2 indicate that reciprocal citations has the third strongest coefficient of all regression coefficients ($b = 0.028$, $p < 0.01$ in Model 5) indicating that "payback" phenomenon does indicate play an important role in driving current citation behavior of individual authors. Results of the present study with respect to other control variables also indicate that knowledge seekers are inclined to acquire knowledge from people with the same gender and from those who reside in the same country as the knowledge seeker. However, results for publication proficiency similarity indicate that citing authors prefer to cite authors from a different publication proficiency group rather than to cite authors within the same publication proficiency group. The negative sign on this coefficient appears quite plausible and appropriate as there are inherently a larger number of authors who belong to a lower publication proficiency group, and who would like to cite authors belonging to a higher publication proficiency group to gain academic credibility and legitimacy of their work (Judge et al. 2007; Sparrowe et al. 2011).

Post Hoc Results

The previous analysis discussed above considered affiliation similarity for an author dyad as a key variable based on the actual affiliations of the authors in the dyad. However, Judge et al. (2007) proposed that affiliation prestige impacts article citations. To test this notion of affiliation prestige similarity affecting citation behavior, we conducted a post hoc analysis in which we replaced *affiliation similarity* (whether or not an author pair belongs to the same institution) with *affiliation prestige similarity* (whether or not an author pair belongs to an elite institution). For this analysis, affiliations of the 1034 focal authors were first categorized into two groups with top 100 universities constituting the elite group (abbreviated as EGroup) and all the other universities constituting the non-elite group (abbreviated as Non-EGroup) based on the 2012 World University Rankings from Times Higher Education (<http://www.timeshighereducation.co.uk>). Authors affiliated with a company or a research center were categorized in the Non-EGroup since industry employment is generally accorded a lower level of scientific prestige as compared to university employment (Beyer et al. 1995; Judge et al. 2007). These two types of affiliation prestige yields four combinations of affiliation prestige similarity between an author pair: citing author in EGroup and cited author in EGroup (labeled as Affiliation Prestige Similarity EE), cited author in EGroup and cited author in Non-EGroup (labeled as Affiliation Prestige Similarity EN), cited author in Non-EGroup and cited author in EGroup (labeled as Affiliation Prestige Similarity NE), and cited author in Non-EGroup and cited author in Non-EGroup (labeled as Affiliation Prestige Similarity NN). Therefore, three new dummy variables for Affiliation Prestige Similarity EN, Affiliation Prestige Similarity NE, and Affiliation Prestige Similarity NN with a value of 0 and 1 were included in our post hoc model to capture the actual affiliation prestige similarity of an author pair (with the baseline being Affiliation Prestige Similarity EE). These three affiliation prestige similarity dummies were also used as moderators of the impacts of previous citations and previous coauthorships on current citations. Results of this post hoc analysis are shown in Table 3 below.

Table 3. Post Hoc Results with MRQAP Models						
Dependent Variable: Current Citations (by author i of author j)						
		Model 6	Model 7	Model 8	Model 9	Model 10
Controls	Publication Proficiency Similarity	-0.005***	-0.007**	-0.007***	-0.007***	-0.007***
	Country Similarity	0.026***	0.015***	0.015***	0.015***	0.015***
	Gender Similarity	0.004**	0.003*	0.011*	0.003**	0.011*
	Reciprocal Citations	0.050***	0.028**	0.028***	0.026**	0.026***
IV	Affiliation Prestige Similarity EN		-0.007**	-0.003	-0.007**	-0.003
	Affiliation Prestige Similarity NE		-0.002	0.001	-0.002	0.001
	Affiliation Prestige Similarity NN		-0.006	0	-0.006	0
	Previous Citations		0.123***	0.123***	0.121***	0.121***
	Previous Coauthorships		0.051***	0.051***	0.058***	0.058***
Interaction	Previous Citations * Affiliation Prestige Similarity EN			-0.005		-0.005*
	Previous Citations * Affiliation Prestige Similarity NE			-0.004		-0.004

	Previous Citations * Affiliation Prestige Similarity NN			-0.009		-0.009*
	Previous Coauthorships * Affiliation Prestige Similarity EN				-0.024***	-0.024***
	Previous Coauthorships * Affiliation Prestige Similarity NE				-0.019***	-0.019***
	Previous Coauthorships * Affiliation Prestige Similarity NN				0.025***	0.025***
R square		0.003	0.023	0.024	0.024	0.024
# of observations (author dyads)		1068122	1068122	1068122	1068122	1068122

*** p < 0.01, ** p < 0.05, * p < 0.10

Table 3. Post Hoc Results with MRQAP Models

Model 6 in Table 3 with 4 controls yielded an R^2 value of 0.003. All other models yielded an R^2 value of at least 0.023. Results of the full model, Model 10, show that the three affiliation prestige similarity dummies don't have a significant impact on current citations. Results for the impacts of previous citations and previous coauthorships on current citations in Model 10 in Table 3 are similar in magnitude and significance to results for these variables in Model 5 in Table 2. However, an interesting and different pattern emerges when the moderation effects of affiliation prestige similarity in Model 10 in Table 3 are compared with the moderation effects of affiliation similarity in Model 5 in Table 2. First, empirical results from Model 10 demonstrate that the crossing of affiliation prestige boundaries slightly reduces an author's intention to cite previously cited authors ($b = -0.005$, $p < 0.01$; and $b = -0.004$, $p = ns$ for Affiliation Prestige Similarity EN and Affiliation Prestige Similarity NE, respectively) and/or previous coauthors ($b = -0.024$, $p < 0.01$; $b = -0.019$, $p < 0.01$ for Affiliation Prestige Similarity EN and Affiliation Prestige Similarity NE, respectively). While the coefficient for the moderation effect of Affiliation Prestige Similarity NE on the influence of previous citations on current citations has a negative sign, it is statistically not significant. There are several possible explanations for non-significant results in an analysis of this type, but the most plausible explanation for this non-significant finding may be the fact that the ratio of author dyads having previous citations to all possible author dyads is very small, and the sub-sample for this specific scenario where the citing author is not in an elite institution and the cited author is in an elite institution is even smaller. Second, when both authors of an author pair belong to non-elite universities (i.e., Affiliation Prestige Similarity NN = 1), the impact of previous coauthorships on current citations increases ($b = 0.025$, $p < 0.01$ in Model 10) whereas the impact of previous citations on current citations reduces ($b = -0.009$, $p < 0.10$ in Model 10). Third, when both authors of an author pair belong to non-elite universities (i.e., Affiliation Prestige Similarity NN = 1), the additional positive impact of previous coauthorships on current citations is much stronger ($b = 0.025$, $p < 0.01$ in Model 10) as compared to the reduction in the impact of previous citations on current citations ($b = -0.009$, $p < 0.10$ in Model 10). Finally, based on the results of Model 10 in Table 3, we can surmise that the moderation effects of affiliation prestige similarity are much stronger for the effects of previous coauthorships on current citations ($b = -0.024^{***}$, -0.019^{***} , 0.025^{***}) than for the effects of previous citations on current citations ($b = -0.005^*$, -0.004^{ns} , -0.009^*).

Discussion, Contributions, and Future Direction

Our goal in this study was to explain the cooperative and competitive drivers of citation behavior of IS researchers. In academia, citation counts is one of the most important index for scientific performance evaluation, at the individual level, at the organizational level, or even at the country level (Trier et al.

2013). With the mounting pressure to provide strong theory building in publications, the academic field is full of knowledge seeking activities, which are manifested as citations in published articles. By analyzing current citations as academic knowledge seeking from the theoretical lenses of cooperation and competition, we contribute to the literatures in two significant ways. First, our study fills in the major research gap about a lack of knowledge about why IS scholars cite other scholars. While there is much literature on understanding why particular articles are cited, to our knowledge, this is the first study that addresses in a comprehensive way using a large data set the question of what drives IS researchers' citation behaviors. We address this question from a social capital and knowledge seeking perspective and develop the logic of cooperation among IS scholars, as reflected in previous citations by one author of another author and previous coauthorships of the two authors. Our study provides empirical evidence that both relational capital as captured in previous coauthorships and cognitive capital as captured in previous citations, which indicate strong and weak cooperation between the two authors, respectively, help an IS scholar seek knowledge from scholars, as expected. Our results support the premise that social networks serve as a knowledge source for network actors and facilitate knowledge seeking activities in the IS field. Our results further indicate that cognitive capital plays the dominant role in knowledge seeking decisions, as compared to relational capital. Simply speaking, when an IS scholar attempts to acquire knowledge from other scholars, he/she is more likely to strategically choose those scholars with whom he/she shares a common language, interpretations, and the same knowledge domain (high cognitive capital) rather than those scholars with whom he/she had previous coauthorship relationships (high relational capital). This result is also consistent with network theory which suggests that weak ties provide more diverse and non-overlapping knowledge to network members (Granovetter, 1973), as previous coauthorship indicates a strong tie between two authors of an author pair while previous citation indicates a weak tie between the two authors. Diversity of knowledge gained through previous citations of the relevant research of other authors is an important element in citation behavior, as a diverse and comprehensive set of citations that includes not only the work of previous coauthors but also the relevant research of other authors is necessary to provide credibility and legitimacy to an author's research. Our study confirms the primacy of cognitive capital in driving citation behavior of IS scholars by studying the effects of both the cognitive and relational capitals simultaneously on the knowledge seeking activities of IS scholars.

This study makes a second significant contribution by studying both cooperation and competition simultaneously as drivers of academic citations. First, we theorize that both competition arising from affiliation similarity and cooperation arising from previous coauthorships and previous citations exists in academic knowledge seeking networks, and that the two forces combine and interact to exert their influence on an IS scholar's decisions about citations of network members. Our main analysis provides strong evidence of the negative moderating role of competition (arising from affiliation similarity) on the positive effects of the two types of cooperation on IS scholar's current citations. The positive impacts of cooperation on current citations are slightly but definitely diminished when the author pair shares the same affiliation, no matter whether the two authors in the author pair were former coauthors or whether one author cited the other in the past. The weak cooperation between the two authors in terms of previous citations suffers more from the competition arising from the same affiliation in terms of its impacts on knowledge seeking (current citations) promoted by this weak cooperation. In other words, weak ties in academia are more fragile when competition heats up. Because strong ties are built from frequent interactions and require long-term maintenance, it is reasonable to expect that scholars are more likely to cut loose their weak ties that are reflected in previous citations in the face of competition.

The post hoc analysis, in which we replaced affiliation similarity with affiliation prestige similarity, yielded different but interesting results as well. The effects of both previous coauthorships and previous citations on current citations are diluted when the author pair crosses the boundaries of affiliation prestige, i.e., when the two authors in an author dyad are affiliated with institutions at different prestige levels. However, the dilution of effects from affiliation prestige dissimilarity is much stronger for previous coauthorships than for previous citations. This suggests that previous strong ties (with previous coauthors) are ditched at a much stronger rate as compared to previous weak ties (with other authors whose work was cited in the past) when the citing and cited authors belong to institutions with different prestige. Further, the effect of previous coauthorships on current citations increases when both the coauthors are affiliated to non-elite institutions. These results arise perhaps because authors belonging to non-elite institutions are working as a group to increase each others' citations. For schools in different

prestige levels, the journal targets and requirements for publications and citations are different. Therefore, it is more practical for authors in non-elite schools to cite their coauthors also in non-elite schools as both share the same publication target. For the same reason, previous coauthorship may also take a bigger hit when the coauthors do not share the same affiliation prestige. However, the theoretical rationale for these findings needs to be more fully developed and addressed in future research.

In practice, we simply answer the question: what drives IS researchers' citation behaviors. All members of the IS field can benefit by developing a better understanding about cooperation strategies with other IS scholars for advancement of their academic careers. Our results provide good news for the IS field and for scholars in the field as we find that citations by an author of another author are driven primarily by objective considerations of knowledge overlap and common language in certain domains between the two authors rather than being driven primarily by relational considerations emanating from previous coauthorship relationships between those two authors. Further, our study also provides some pointers to administrators and policy makers within universities regarding competition among IS scholars that emanates from affiliation similarity and which somewhat dampens citations resulting from prior cognitive and relational capital between the citing and the cited authors. University leaders can make better decisions about individual performance of different faculty members in IS departments in terms of total citations knowing that citations by one faculty of another faculty in the same university are dampened due to competition between the two authors arising from resource and reputation considerations.

Despite its contributions, this study has several areas to be addressed in future research. First, we operationalized competition among IS scholars emanating from affiliation similarity arguing that limited resources in an organization spur competition among scholars in the same organization. However, different types of important resources are required by IS scholars, such as research funding, graduate student assistance, travel grants, promotions, etc., and the distribution and availability of these resources may be different in different schools. Future studies should consider some of these specific resources to study the relative impacts they have as competition inducing factors. Second, while we conducted a post hoc analysis after replacing affiliation similarity with affiliation prestige similarity to shed some additional light on the competition arising from affiliation prestige and differential allocation of resources to different institutions based on their prestige, we didn't develop a formal theory of this type of competition. Future research should focus on this particular type of competition to formally understand how affiliation prestige may induce competition among authors and moderate the impact of authors' cooperative behaviors on their knowledge seeking behaviors. Third, we did not include structural capital in the present study. As an important form of social capital, structural capital describes the connection configuration between or among members of a network. It provides information about the other actors a network actor can reach and how this actor reaches the other actors in the network. Structural capital captures the position of an individual actor relative to the configuration of the entire network, and how that position confers certain advantages to the focal actor. In the current study, our focus is on dyadic relationships between author dyads (citing and cited authors) and not on the relationship between an individual author and the entire network of authors. For instance, centrality of an author, a measure of structural capital, is not of interest in the present study as we cannot predict citations by an author *i* of an author *j* based on the centrality of author *i* (or of author *j*) in the citation or co-authorship network. However, future research should consider ways in which structural capital can be operationalized in a dyadic context and should test its impact on citation behaviors. Fourth, only one measure each was used to operationalize cognitive and relational capital in this study. Future studies should devise and compare multiple measurements for each of these two social capital constructs to make the analysis more robust. Fifth, and finally, while we included an extensive set of premier IS journals in this study, we did not include the articles published in the IS section of Management Science in our sample due to the limited number of articles published in that section. We don't expect the inclusion of those articles to change the results of this study in any significant manner. However, from the perspective of rigor and for the sake of completeness, future research should incorporate the IS section of Management Science in any citations analysis.

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